SEMESTER - V

S.No	Category	Course Code	Course Title	L	T	P	C
Theory	W			A 1			
1	PC	CL20501	Computer Networks	3	0	0	3
2	PC	CL20502	Foundations of Data Science	3	0	0	3
3	HS	BA20151	Entrepreneurship Development	3	0	0	3
4	PC	CL20503	Software Engineering	3	0	0	3
5	PC	CL20504	Deep Learning	3	0	0	3
6	PE	CL2015*	Professional Elective – I	3	0	0	3
Practica	al						
7	PC	CL20505	Computer Networks Laboratory	0	0	4	2
8	PC	CL20506	Deep Learning Laboratory	0	0	4	2
9	EE	EN20501	Career Development Laboratory I	0	0	2	1
			TOTAL	18	00	10	23

SEMESTER - VI

S.No	Category	Course Code	Course Title	L	Т	P	С
Theory							
1	PC	CL20601	AI and Robotics	3	0	0	3
2	PC	CL20602	Data Analytics	3	0	0	3
3	PC	CL20603	Internet of Things	3	0	0	3
4	PC	CL20604	Optimization Techniques	3	0	0	3
5	PE	CL2025*	Professional Elective – II	3	0	0	3
6	OE	CL2090*	Open Elective – I	3	0	0	3
Practica	al						
7	PC	CL20605	AI and Robotics Laboratory	0	0	2	1
8	PC	CL20606	Data Analytics Laboratory	0	0	4	2
9	EE	EN20601	Career Development Laboratory II	0	0	2	1
			TOTAL	18	00	08	22

PROFESSIONAL ELECTIVES (PE)

PROFESSIONAL ELECTIVE - I

S.No	Category	Course Code	Course Title	L	Т	P	C
1	PE	CL20151	Cyber Security	3	0	0	3
2	PE	CL20152	Information Extraction and Retrieval	3	0	0	3
3	PE	CL20153	Advanced Machine Learning	3	0	0	3
4	PE	CL20154	Nature Inspired Computing Techniques	3	0	0	3

PROFESSIONAL ELECTIVE - II

S.No	Category	Course Code	Course Title	L	T	P	С
1	PE	CL20251	Engineering Predictive Analytics	3	0	0	3
2	PE	CL20252	Computer Vision	3	0	0	3
3	PE	CL20253	Block Chain and Cryptography	3	0	0	3
4	PE	CL20254	Human Machine Interaction	3	0	0	3

PROFESSIONAL ELECTIVE - III

S.No	Category	Course Code	Course Title	L	T	P	С
1	PE	CL20351	Natural Language Processing	3	0	0	3
2	PE	CL20352	Data and Information Security	3	0	0	3
3	PE	CL20353	Cognitive Systems	3	0	0	3
4	PE	CL20354	Computational Neuroscience	3	0	0	3

PROFESSIONAL ELECTIVE - IV

S.No	Category	Course Code	Course Title	L	T	P	С
1	PE	CL20451	Agile Methodologies	3	0	0	3
2	PE	CL20452	Operations and Supply Chain Management	3	0	0	3
3	PE	CL20453	Image and Video Analytics	3	0	0	3
4	PE	CL20454	Principles of Management	3	0	0	3

PROFESSIONAL ELECTIVE - V

S.No	Category	Course Code	Course Title	L	T	P	С
1	PE	CL20551	Soft Computing in Medical Diagnostics	3	0	0	3
2	PE	CL20552	Cryptography and Network Security	3	0	0	3
3	PE	CL20553	Ethics of AI	3	0	0	3
4	PE	CL20554	Big Data Analytics	3	0	0	3

PROFESSIONAL ELECTIVE – VI

S.No	Category	Course Code	Course Title	L	Т	P	С
1	PE	CL20651	Wireless Sensor Networks	3	0	0	3
2	PE	CL20652	Knowledge Based AI	3	0	0	3
3	PE	CL20653	Social Network Analytics	3	0	0	3
4	PE	CL20654	Business Analytics	3	0	0	3

OPEN ELECTIVE I

S.No	Category	Course Code	Course Title	L	T	P	С
1	OE	CL20901	Green Computing	3	0	0	3
2	OE	CL20902	Artificial Intelligence	3	0	0	3

OPEN ELECTIVE II

S.No	Category	Course Code	Course Title		L	T	P	С
1	OE	CL20903	Data Science		3	0	0	3
2	OE	CL20904	Software Project Management	Systems	3	0	0	3



SEMESTER - V

CL20501		SEMESTER - V					
		COMPUTER NETWORKS		3	0	0	3
COURSE OBJECTI	VES						
To enable the students							
		vering and physical level communication	n.				
2. list the variou	s components	required to build different networks.					
3. learn the func	tions of netwo	ork layer and the various routing protoc	cols.				
4. familiarize the	e functions an	d protocols of the transport layer.			_		_
5. list the variou	s protocols of	application layer.					
UNIT I INTR	ODUCTION	AND PHYSICAL LAYER				T	9
Networks - Network T	ypes – Protoc	ol Layering – TCP/IP Protocol suite – (OSI Model – Ph	veic	al I	01/01	
refrontiance - Transmi	ission media -	- Switching – Circuit-switched Networ	ks – Packet Swi	tchi	ai L ng.	ayei	•
UNII II DATA	LINK LAY	ER & MEDIA ACCESS				1)
Introduction – Link-La Media Access Control	yer Addressir	ng – DLC Services – Data-Link Layer	Protocols – HD	DLC	– P	PP -	-
Bluetooth – Connecting	- Wifed LA	ANs: Ethernet – Wireless LANs – In	troduction - II	EEE	802	2.11	,
	ORK LAYE	CR					
						9	
IP Packets – Network	Laver Protoco	ing – Network services models – Ipv4 ols: Ipv4, ICMP v4 – Unicast Routing	Addresses – Fo	rwa	rdin	ig of	
Multicasting Basics - Ip	ov6 Addressin	g – Ipv6 Protocol.	g Algorithms –	Pro	toco	ols –	0.00
	SPORT LAY				-	9	+
ntroduction - Transport	Layer Protoc	ols – Services – Multiplexing and De-M	[u]tim1i D				
- User Datagram Protoc	ol – Transmis	ssion Control Protocol – SCTP.	iuitipiexing – Po	ort N	lum	bers	
UNIT V APPLI	CATION LA	YER				9	+
WWW and HTTP – FTI	P – Email – To	elnet – SSH – DNS – Peer to Peer appl	ications CNIM	D			+
		Test to Feet appli		100			+
COURSE OUTCOME	S		TOTAL PER	IOI	OS	45	
At the end of this course	, students wil	l be able to	DT M				
			BT Map (Highest I	1000			
CO1 compare the prot	tocol layering	and physical level communication.	Understa			K2)	
networks.		onents required to build different	Anal		34-27 - 63		
examine the fun	ections of net	work layer and the various routing					
protocols. O4 explore the funct	ione and		Anal	yzin	g (F	(4)	
1		ocols of the transport layer.	Anal	yzin	g (k	(4)	
	ous protocols	of application layer.	Anal	yzin	g (k	(4)	
EXT BOOKS 1. Behrouz A Forou							
Hill, 2013.	ızan, "Data C	Communication and Networking", Fift	h Edition, Tata	Mc	Gra	W-	
,	-						

2. Nader.F.Mir, "Computer and Communication Networks", Second Edition, Pearson Prentice Hall Publishers, 2014.

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- 2. Larry L.Peterson, Bruce S.Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers, 2012.
- 3. William Stallings, "Data and Computer Communication", Tenth Edition, Pearson Education, 2013.
- 4. Alan Dennis, Jerry FitzGerald, Alexandra Durcikova, "Business Data Communications and Networking", 14th Edition, ISBN: 978-1-119-70284-9.

CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

	(1/2/0	PO's										PSO's		
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1	3	2	2	-	_	1	120	-	1	1	3	2
CO1		1	-		1		-	1	_	_	2	1	3	2
CO2	2	2	3	1	1	-		1				1	2	-
CO3	3	2	3	2	2	-	-	2	-	-	2	1	3	2
CO4	3	2	3	2	2	-	-	2	-	-	2	1	3	2
		<u> </u>	-	-	-			2			2	1	3	3
CO5	1	3	2	2	2	-	-							



	502		FOUNDATIONS OF DATA SCIENCE	E	3 0	0	3
COUF	RSE OBJE	CCTIVES					
To ena	ble the stu	dents to					
1.	understa	and the key c	concepts of Data Science and its Applications.				
2.	analyze	the results o	n Data Collection and Data Pre-Processing.				
3.	recall th	e mathemati	cal concepts for descriptive and statistical analy	ysis of the give	en data	set.	
4.	apply M	lodel develop	pment and evaluation.	Toward leg			
5.	analyze	the results o	n Model Evaluation metrics and validation.				
UNIT	I	INTRODUC	CTION				9
Introdu	uction to D	ata Science -	- Evolution of Data Science - Data Science Role	es – Stages in a	Data S	cie	106
-			a Science in various fields – Data Security Issu				
UNIT			LLECTION AND DATA PRE-PROCESSIN				9
		_	Data Pre-Processing Overview – Data Clean	ning – Data In	tegration	on a	ınc
UNIT			ction – Data Discretization. TORY DATA ANALYTICS				9
UNIT	IV	MODEL DI	EVELOPMENT				_
UNIT Descri Heat N UNIT	ptive Stati Map – Corr	MODEL DI stics – Mean elation Statis MODEL EV	n, Standard Deviation, Skewness and Kurtosis stics – ANOVA. VALUATION				e -
Heat N UNIT Genera Fitting	ptive Stati Map – Corr V	stics – Mean elation Statis MODEL EV Tror – Out-cel Selection	n, Standard Deviation, Skewness and Kurtosis stics – ANOVA.	tion – Over fi ing Multiple I	tting – Parame	Un	e -
Descri Heat M UNIT General Fitting	ptive Stati Map – Corr V alization E g and Mod Grid Searc	stics – Mean elation Statis MODEL EX error – Out- el Selection h.	n, Standard Deviation, Skewness and Kurtosis stics – ANOVA. VALUATION of-Sample Evaluation Metrics – Cross Validation	tion – Over fi	tting – Parame	Un	de
Descri Heat M UNIT General Fitting using G	ptive Stati Map – Corr V alization E g and Mod Grid Searc	stics – Mean elation Statis MODEL EX Tror – Out-cel Selection h.	n, Standard Deviation, Skewness and Kurtosis stics – ANOVA. VALUATION of-Sample Evaluation Metrics – Cross Validation	tion – Over fiing Multiple I TOTAL PI BT M	tting – Parame ERIOD	Un ters	e -
Descri Heat M UNIT General Fitting using G	ptive Stati Map – Corr V alization Est and Mod Grid Searc RSE OUT end of this	stics – Mean elation Statis MODEL EX Tror – Out-cel Selection h. COMES s course, stud	n, Standard Deviation, Skewness and Kurtosis stics – ANOVA. VALUATION of-Sample Evaluation Metrics – Cross Validate Prediction by using Ridge Regression – Test	tion – Over fi ing Multiple I TOTAL PI BT M (Highes	tting – Parame ERIOD	Unters S I)	de by
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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

						P	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	1	2	-	-	-	-	-	-	1	2	. 2	2
CO2	2	1	2	1	-	-	-	-	-	-	1	2	2	3
CO3	2	2	1	2	-	-	-	-	-	-	1	3	2	2
CO4	3	2	2	1	-	-	-	-	-	-	2	2	3	3
CO5	2	2	1	2	-	-	_	-	-	-	1	2	2	2



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Entrepreneurship in Informal Sector: Rural Entrepreneurship – Entrepreneurship in Sectors like Agriculture, Tourism, Health care, Transport and allied services.

		TOTAL PERIODS 45
COUI	RSE OUTCOMES	
At the	end of this course, students will be able to	BT Mapped
		(Highest Level)
CO1	implement the necessary managerial skills to become an	Understanding (K2)
	entrepreneur.	
CO2	take up self-employment having been exposed to entrepreneurial	Understanding (K2)
	environment.	
CO3	select a best business idea by using appropriate methods to assess its	Applying (K3)
	viability.	
CO4	formulate a business plan & deploy the resources for sustainable	Understanding (K2)
	growth.	
CO5	analyse channels and means of launching a small business in any	Applying (K3)
	sector.	

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- 2. Saravanavel. P, "Entrepreneurial Development", Ess Pee Kay Publishing House, Chennai, 2013.

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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

						P	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	3	1	-	2	2	2	-	2	3	2	3
CO2	-	2	2	-	2	1	-	-	-	-	1	`1	1	3
CO3	-	1	1	-	1	1	_1_	-	1	1	1	3	-	3
CO4	1	1	-	-	ME	KING	CALT	EGN	3	1	1	3	1	2
CO5	1	1	1	1/3	IB	APDO	FSTU	1	2	1	-	3	-	1

Master of Business Administration

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CL205	503				SOFTV	WARE	EENG	SINE	ERI	NG	201	٥.		3	0 0	0 3
COUF	RSE OB	JECTIVE	S													
To ena	able the	students to														
1.	select	Software	ife cycle	mode	ls and I	Process	s mod	els fo	r de	velop	ing a	syst	em fr	om s	crate	h.
2.	under	stand fund	amental co	oncep	ts of re	equirem	nent e	ngine	erin	g.						
3.	acqui	re knowled	ge about l	Desig	n levels	s of sof	ftware	e engi	inee	ring.	77 - 7					
4.	learn	various so	tware test	ting m	ethods	S.						100000				
5.	study	the softwa	re project	mana	gemen	t conce	epts.					Tie				
UNIT	I	SOFTW	ARE PR	OCE	SS											9
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COUF	RSE OUTCOMES	
At the	end of this course, students will be able to	BT Mapped (Highest Level)
COI	classify the different process models.	Applying (K3)
CO2	apply fundamental concepts with analysis and modelling for a software requirement.	Applying (K3)
CO3	examine different methods for the design of a software system.	Applying (K3)
CO4	imply software testing methods.	Applying (K3)
CO5	implement documentation for software engineering process.	Applying (K3)

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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

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						P	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	1	-	-	-	3	-	-	2	2	2	1
CO2	3	2	3	1	- ,	-	-	2	-	-	2	3	1	2
CO3	3	3	3	3	-	-	-	1	-	-	1	2	2	1
CO4	3	3	3	3	-	-	-	1	-	-	1	2	2	1
CO5	3	3	2	1	-	-	-	3	-	-	3	3	1	3



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COUP	RSE OBJE	CTIV	ES													
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1.	present t	the bas	ics of net	ural 1	netw	orks.										
2.	study the	e conce	pts of de	eep le	earn	ing.										
3.	introduc	e dime	nsionalit	y red	ducti	on tec	hniqu	ies.	-17		ettlet de					
4.	understa	ind dee	p learnin	g tec	chnic	ques to	supp	ort re	eal-tim	e appl	ication	ıs.				
5.	analyze	the cas	e studies	of d	deep	learni	ng tec	chniqu	ies.							
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- 1. Cosma Rohilla Shalizi, "Advanced Data Analysis from an Elementary Point of View", 2015.
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						P	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	1	-	1	- 1	-	-	-	2	-	2	2
CO2	3	2	1	2	-	2	-	-	-	-	2	-	2	2
CO3	3	3	2	1	-	2	-	-	-	-	2	-	2	3
CO4	3	1	1	1	-	3	-	-	-	-	2	-	3	2
CO5	2	3	2	1	-	1	-	-	-	-	2	-	2	2



CL2	0505	CC	MPUTER NETWORKS LABORATOR	Y	0	0	4	
COL	JRSE OBJE	CTIVES			U	0	4	
To e	nable the stu	dents to						
1.	understan	d the basics	and working Networking Protocols using C	isco Packet	Trace	r	-	_
2.	implemen	t the various	s mechanism of supporting protocols of each	layer throu	gh Do	okot '	Гиол	
3.	familiar v	vith the vario	ous routing algorithms.	rayer unou	girra	CKCL	Tace	л. —
4.		use simulati						
LIST	OF EXPE	RIMENTS						_
1	. There are	20 PCs in ye	our network. Five PCs are connected to one	Ethernet hu	b. and	five	PCs	ar
	connected	l to another l	nub. Each hub is connected to separate switch	ch and both t	he sw	itche	c ara	ш
	connected	to a separat	e router. The routers are connected via an E	thernet bride	ne Sw	2 =2=	s are	
	10 PCS ar	e connected	directly to one of the two switches. How m	oner Eth annual	ge. In	e ren	iainii	ıg
	there? Im	olement this	scenario using Cisco Packet Tracer.	any Emerner	t segn	ients	are	
2.			nent Bit Stuffing and Byte Stuffing.					
3.								
٥.	the given		n scheme, choose pattern 1101 and data 100	0100. Write	a code	e to e	ncod	е
1								
4.	In an Ipv4	packet, the	value of header length is 1000 in binary. Wi	rite a code to	find,	how	man	y
			ing carried by this packet?					
5.	Write a co	de to implen	nent Distance Vector Routing algorithm (D	VR).				
6.	Write a co sockets.	de to implen	nent HTTP web client program to download	a web page	using	TCP		
7.	Write a co	de to implen	nent Border Gateway Protocol (BGP).					_
8.			er, DHCP server and a DNS server all togeth	ner in a sinol	le sim	ulatio	'n	
	through wl	nich IP have	to be allocated for the host through DHCP	server Conv	ersion	of.	711	
	Canonical	Name to IP	address to be done by DNS server and Acce	es to the wel	bnaca	101	- 1	
	given by w	eb server us	ing Cisco Packet Tracer.	ss to the wel	opage	nas t	o be	
9.			er using Wireshark Tool.					
			or doing wheshark 1001.					
				TOTAL	PERI	ODS	60)
	RSE OUTCO							
ttne	end of this c	ourse, studer	nts will be able to	B	ГМај	pped		
O1	compare the	e Networkin	g Protocols using Cisco Packet Tracer.		ghest		-	
O2	analyze the	various wor	king mechanism of supporting protocols	Ana	lyzin	g (K4)	
	of each laye	er through Pa	ncket Tracer.	Ana	lyzin	g (K4)	
O3	compare the	e various rou	ting algorithms in data networks.	Ana	lyzing	(K4)	
04	analyze the simulation t	performance	e of various network protocols using		lyzing			
	January III				J E	7 (** 1	,	

CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

						PC)'s						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	1	2	1	-	-	2	-	2	1	3	3
CO2	3	1	2	2	2	1	-	-	2	-	2	1	2	2
CO3	3	3	2	1	2	1	-	-	2	-	2	1	3	3
CO4	2	3	1	3	2	1	-	-	2	-	2	1	2	1



CL20	506			DE	EP LE	ARNI	NG LA	BORA	TORY	7		0	0	4	2
COU	RSE O	BJECT	TIVES												
To ena	able the	studer	its to												
1.	under	stand t	he theo	retical	foundat	tions, a	lgorithr	ns and	method	lologies	of Ne	ural N	etwo	rk.	
2.	desig	n and c	levelop	an app	lication	using	specific	deep l	earning	model	s.				
3.	provi	de the	practica	l know	ledge in	n handl	ing and	lanalys	ing rea	l world	applica	ations.			
4.	gainir used i	ng prac n deep	tical ex learnir	periend ng.	ce in pro	ogramn	ning an	d empo	wering	studen	ts with	tools	and t	echn	iques
LIST	OF EX	PERI	MENT	S											
1.	Solvi	ng XO	R probl	em usi	ng Mul	tilayer	percept	ron.							
2.	Imple	ment o	haracte	er and I	Digit Re	cogniti	on usin	g ANN							
3.	Imple	ment t	he anal	ysis of	X-ray i	mage u	sing au	to enco	ders.						
4.	Imple	ment S	Speech	Recogn	ition us	sing NI	P.								
5.	Deve	lop a c	ode to d	lesign o	bject d	etection	n and c	lassifica	ation fo	r traffi	c analys	sis usi	ng C	NN.	-
6.		The same of the sa	and the second second		tection										ols.
7.					ation u					-					
8.	Imple	ment S	entime	nt Ana	lysis us	ing LS	TM.								
9.	Mini	Project	: Numb	er plat	e recog	nition o	of traffi	c video	analys	is.					-
The second											TOTA	T DE:	220		
											TOTA	L PE	RIO.	DS	60
	end of			ıdonta i	will be	abla ta						TO 10 10 10 10 10 10 10 10 10 10 10 10 10			
At the	cha or	uns co	urse, su	dents	will be	able to						BT M Highe			
CO1	classi	fy the o	haracte	ristics	of deep	learnin	ng mod	els that	are use	ful					
			world p								Α	nalyz	ing (K4)	
CO2	1,000		differe	nt meth	odolog	ies to c	reate ap	plicati	on usin	g	A	nalyz	ing (K4)	
CO3	deep r		lata by	identify	ing and	l apply	ing onn	ronriet	doon						
005					iety of			торпац	deep		Α	nalyz	ing (K4)	
CO4							113.								
	invest	igate d	ifferent	deep le	earning			d desig	n the te	est					
	proced	lures to	assess			algorit	hms an			est	Α	nalyz	ing (K4)	
	proced O MAP	dures to	assess	the eff	earning ficacy o	algorit	hms an	d mode	el.						
	proced	dures to	assess	the eff	earning ficacy o	algorited the deliberation in the deliberation	hms an evelope ogramn	d mode	el.						eific
	proced O MAP	PING Cours	assess: e Outco	ome (C	earning ficacy o	algorite of the desired of the desir	hms an evelope ogramn mes (P	ne Oute	comes	(PO's)	and Pi	rogran	nme		eific
	proced O MAP	PING Cours	assess: e Outco	ome (C	earning ficacy o	algorited the desired the Proof Outcoogth of	hms an evelope ogramn mes (P	ne Oute	comes	(PO's)	and Pi	rogran	nme	Spec	
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Марр	proceed O MAP ping of	PING Cours	assess: e Outco	ome (C	earning ficacy of CO's) we es stren	algorit of the de ith Pro Outco gth of	ogramn mes (P correla	ne Oute SO's) tion) 3	comes	(PO's)	and Predium,	rogran 1-We	nme ak	Spec PSC)'s 2
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Approved BOARD OF STUDIES BE CSE (AI & ML)

AUTONOMOUS

	501	CAF	REER DEVELOPMENT LABOR	RATORY I	0 0 :	2 1
COU	RSE OBJECTIV	VES				
To ena	able the students	to				
1.	enhance their	writing skills	5.			
2.	evaluate their	presentation	skill to face the corporate world.			
3.	solve the quar	ntitative aptit	ude problems and improve their me	ental ability.		
4.	improve the c	ritical thinkir	ng and reasoning skills.		Name of the last	
UNIT	I WRIT	TING SKILI	LS	dense Stair		6
Writin	g Skills: The E	ssentials of	Writing - The Importance of Str	ructure – Types	of Writing	_
	on Mistakes in V				Ö	
Activi	ties: Email Writi	ng – Paragra	ph writing – Report Writing – Story	y Writing – Story	Telling Ses	sion:
2 - JA	M Session 1.					
UNIT			SKILLS AND GROUP DISCU			6
			ntation – Methods of Delivering Pr			
			; Group Discussion: Introduction- iteria- Do's and Don'ts of GD.	Types and Import	tance – Wh	y
			Group Discussion Session I, Role pany Profile Analysis Session II.	Play Session (Te	am): Level	II –
Percon						
UNIT					-	6
UNIT	III QUAN	NTITATIVE	APTITUDE	Doots and Ctua	т.	6
UNIT Simpli	III QUAN fication – Cubes	NTITATIVE and Cube R	APTITUDE Coots – Squares and Square Roots	- Boats and Stre	eams – Trai	1
UNIT Simpli	III QUAN fication – Cubes and Loss – Pipes	NTITATIVE and Cube R	Roots – Squares and Square Roots	- Boats and Stre	eams – Trai	1
UNIT Simpli Profit	III QUAN fication – Cubes and Loss – Pipes IV LOGI	NTITATIVE s and Cube R and Cisterns CAL REAS	CAPTITUDE Coots – Squares and Square Roots CONING – I			ns –
UNIT Simpli Profit	III QUAN fication – Cubes and Loss – Pipes IV LOGI Completion – Le	NTITATIVE s and Cube R and Cisterns CAL REAS	APTITUDE Roots – Squares and Square Roots ONING – I Symbol Series – Number Series –			ns –
UNIT Simpli Profit a UNIT Series UNIT	fication – Cubes and Loss – Pipes IV LOGI Completion – Let V LOGI	NTITATIVE s and Cube R and Cisterns CAL REAS etter Series – CAL REAS	APTITUDE Roots – Squares and Square Roots ONING – I Symbol Series – Number Series – ONING – II			ns –
UNIT Simpli Profit a UNIT Series UNIT	fication – Cubes and Loss – Pipes IV LOGI Completion – Let V LOGI	NTITATIVE s and Cube R and Cisterns CAL REAS etter Series – CAL REAS	APTITUDE Roots – Squares and Square Roots ONING – I Symbol Series – Number Series –	Arithmetic Reaso	ning.	ns –
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Simpli Profit a UNIT Series UNIT Blood	fication – Cubes and Loss – Pipes IV LOGI Completion – Let V LOGI Relations – Seati	and Cube R and Cisterns CAL REAS etter Series – CAL REAS ing Arrangen	APTITUDE Roots – Squares and Square Roots ONING – I Symbol Series – Number Series – ONING – II nent – Character Puzzle.	Arithmetic Reaso	ning. PERIODS	ns –
Simpli Profit a UNIT Series UNIT Blood COUR	fication – Cubes and Loss – Pipes IV LOGI Completion – Le V LOGI Relations – Seati	and Cube R and Cisterns CAL REAS etter Series – CAL REAS ing Arrangen ES e, students w	Roots – Squares and Square Roots CONING – I Symbol Series – Number Series – ONING – II ment – Character Puzzle.	Arithmetic Reaso	ning.	ns –
Simpli Profit a UNIT Series UNIT Blood COUR At the	fication – Cubes and Loss – Pipes IV LOGI Completion – Let V LOGI Relations – Seati	and Cube R and Cisterns CAL REAS etter Series – CAL REAS ing Arrangen ES e, students w g mails and s	APTITUDE Roots – Squares and Square Roots ONING – I Symbol Series – Number Series – ONING – II nent – Character Puzzle. ill be able to peaking.	Arithmetic Reaso TOTAL I BT (High	ning. PERIODS Mapped	ns – 6
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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

						P	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	3	3	1	-	-	-	-	-	-	3	2
CO2		2	3	-	2	-	2	-	-	-	-	-	3	2
CO3	3	2	2	2	-	-	1	-	-	-	-	-	2	3
CO4	3	2	2	-	-	1	-	-	-	-	2	-	2	3



SEMESTER - VI

CT 200	701				0 0	3
CL206	501		AI AND ROBOTICS	3	0 0	
COUR	RSE OBJECTIV	VES				
To ena	ble the students	to				
1.	learn the fund	amentals of I	Robotics and Power Transmission system.			
2.	know the diffe	erent grippers	and its selection constraints.			
3.	understand the	e kinematic e	quations of robots.			
4.	understand the	e fundamenta	ls of machine vision system.	-		
5.	learn the basic	es of robot pro	ogramming and applications.			
UNIT	I INTR	ODUCTION	TO ROBOTICS			9
System	is Hydraulic, pn transmission sys	eumatic, elec stem – Gear c	oot Anatomy Configurations of robot, robot motivatric – Precision of movement Resolution, accurative, screw drive, belt drive, linear drive – Harmo	cy, repe	atabili	ty –
		EFFECTOR				9
force a	nnalysis – Other erations in Grip	r types of Gr per Selection		s End e	ffecto	rs –
	TTT TZTATTS					_
UNIT I	iction - Matrix	representation	on – Homogeneous transformation matrices –	Represe	ntation	9 1 of
Introdu transfo	nction – Matrix rmations Rotati atics of robots.	representation, Translati		Represer ward an	ntation d inv	n of
Introdu transfor kinema UNIT I Introdu Thresho	nction — Matrix rmations Rotati atics of robots. IV MAC action — Imaging olding, edge deten	representation, Translation, Translation, Translation, VISIOn devices – Interpretation, binary Chnique – Rol	on – Homogeneous transformation matrices – on – Denavit Hartenberg representation – For	ward an	d inv	of of erse
Introdu transfor kinema UNIT I Introdu Thresho matchin	rection — Matrix rmations Rotati atics of robots. IV MAC action — Imaging olding, edge dete ng, structural tectors V ROBO	representation, Translation, Translation, Translation, VISIOn devices – In ection, binary chnique – Role of PROGRA	on – Homogeneous transformation matrices – on – Denavit Hartenberg representation – For ON SYSTEM Lighting techniques – Sampling and Quantization of morphology and grey morphology – Object recognotic Applications of machine vision system. AMMING AND APPLICATIONS	n – Seg	d inv	of of erse 9 tion late
Introdu transfor kinema UNIT I Introdu Thresho matchin UNIT I General through	rmation — Matrix rmations Rotati atics of robots. IV MAC action — Imaging olding, edge dete ng, structural tect V ROBO ations of program n, offline program	representation, Translation, Translation, Translation, Translation, USIC g devices – I ection, binary chnique – Role of PROGRAmming languaruming – VA	on – Homogeneous transformation matrices – on – Denavit Hartenberg representation – For ON SYSTEM Lighting techniques – Sampling and Quantization morphology and grey morphology – Object recognition of machine vision system.	n - Seg	menta Temp	of of erse 9 tion late 9
Introdu transfor kinema UNIT I Introdu Thresho matchin UNIT I General through	rmation — Matrix rmations Rotati atics of robots. IV MAC action — Imaging olding, edge dete ng, structural tect V ROBO ations of program n, offline program	representation, Translation, Translation, Translation, Translation, USIC g devices – I ection, binary chnique – Role of PROGRAmming languaruming – VA	on – Homogeneous transformation matrices – on – Denavit Hartenberg representation – For ON SYSTEM Lighting techniques – Sampling and Quantization morphology and grey morphology – Object recognotic Applications of machine vision system. AMMING AND APPLICATIONS Lages – Methods of programming – Manual, was all system and languages – Robot applications is embly, inspection.	n - Seg	menta Temp	of of erse 9 tion late 9
Introdu transfor kinema UNIT I Introdu Thresho matchin UNIT I General through machin	nction — Matrix rmations Rotati atics of robots. IV MAC action — Imaging olding, edge dete ng, structural tect V ROBO ations of program n, offline program ne loading and un actions of program ne loading and un	representation, Translation, Translation, Translation, Translation, Translation, Translation, Experimental Processing of the Processing of	on – Homogeneous transformation matrices – on – Denavit Hartenberg representation – For ON SYSTEM Lighting techniques – Sampling and Quantization of morphology and grey morphology – Object recognotic Applications of machine vision system. AMMING AND APPLICATIONS Lages – Methods of programming – Manual, we had system and languages – Robot applications is embly, inspection. TOTAL	n – Seg gnition – valk thro	menta Temp	9 stion late 9 sead sing,
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Introdu transfor kinema UNIT I Introdu Thresho matchin UNIT I General through machin COUR. At the e	rection — Matrix rmations Rotation in Rotation in Rotation in Rotation in Rotation — Imaging olding, edge deteng, structural tector ROBO R	representation, Translation, Translation, Translation, Translation, Translation, Translation, Translation, Translation, Escholar and Es	on – Homogeneous transformation matrices – on – Denavit Hartenberg representation – For ON SYSTEM Lighting techniques – Sampling and Quantization morphology and grey morphology – Object recognotic Applications of machine vision system. AMMING AND APPLICATIONS Lages – Methods of programming – Manual, was a system and languages – Robot applications is embly, inspection. TOTAL Ill be able to B (High sof Robotics and Power Transmission United States of Robotics and Power	n – Seggnition – ralk thro Material L PERIO T Mapp ghest Lo Appl	menta Temp ugh, handl ODS ed evel) ding (ying (zing (9 tion late 9 tead ing, K2) K3)

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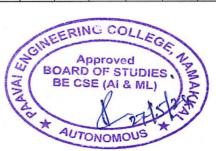
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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

						P	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	2	3	1	-	1	1	-	-	-	1	1	2
CO2	2	1	2	1	2	-	1	1	-	-	-	1	1	2
CO3	2	3	1	2	2	-	1	1	-	-	-	2	2	3
CO4	2	3	2	2	2	-	1	1	-	-	-	2	2	3
CO5	3	3	2	3	3	-	1	1	-	-	-	1	2	3



CL20	1002	DATA ANALYTICS	3 0 0
COU	RSE OB	JECTIVES	
To en	able the s	tudents to	
1.	underst	and the fundamental concepts of Big Data.	
2.	be com	petent in identifying the challenges in handling large volu	imes of data.
3.	propose	e scalable solutions using Hadoop.	
4.	familia day life	rize the impact of Big Data in business intelligence, science.	ntific discovery, and in day-t
5.	learn th	ne tools and techniques for handling large datasets.	Commence and the second
UNIT	'I	INTRODUCTION	
Analy Statist UNIT	tic Tools cical Infer	ig Data – Big Data Use Cases and characteristics – Int – Big Data Storage Statistical Concepts: Sampling Dence – Prediction Error – Random Sampling. BIG DATA TOOLS – I	Distributions – Re-Sampling
Big D	ata Appli	cations using Pig and Hive – Fundamentals of Hbase and	ZooKeeper – IBM Infosphe
Big In	sights - I	ntroduction to FLUME – KAFKA.	
TTS TYPE			
Introd Strean	uction to ning – Cl	HADOOP Hadoop – Hadoop Distributed File System – Analyzing ustering: Single Node and Multi Node – Working with F	data with Hadoop – Scaling
Introd Strean with A	uction to ning – Cl	HADOOP Hadoop – Hadoop Distributed File System – Analyzing ustering: Single Node and Multi Node – Working with F	data with Hadoop – Scaling Hadoop Commands – Workin
with A UNIT Introd Cassai Impor	uction to ning – Clapache Oo IV uction to ndra Arclatance of Italy	HADOOP Hadoop – Hadoop Distributed File System – Analyzing ustering: Single Node and Multi Node – Working with Fozie.	data with Hadoop – Scaling Hadoop Commands – Workin Data Model – Data Design with Hadoop: Introduction Choosing the Right Chart Typ
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CO5	illustrate the tools and techniques for handling large datasets.	Analyzing (K4)

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- 2. Chuck Lam, "Hadoop in Action", Manning Publications Co., 2018.

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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

						P	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1 .	3	2	1	-	-	-	-	-	-	1	3	2
CO2	1	2	3	1	1	-	-	-	-	-	-	2	3	2
CO3	3	2	3	2	2	-	-	-	-	-	-	2	3	2
CO4	1	3	2	2	1	-	-	-	-	-	-	2	3	3
CO5	3	2	3	2	3	-	-	-	-	-	-	1	3	3



	603			INTERNET OF THIN	GS		3	0	0
COU	RSE OB	JECTIVES							
To ena	able the s	tudents to							
1.	under	stand the con-	cepts of I	nternet of Things.			4		
2.	identi	fy the various	element	s of an IoT System.					T
3.	under	stand the vari	ous mear	s of communication from No	de / Gatew	ay to Cloud	Plat	forms	S.
4.	identi	fy types of da	ta analyt	cs and data visualization tool	S.	Water Bridge			
5.	make	students awar	e of secu	rity concerns and challenges	while impl	ementing Io	T so	lutior	ıs.
UNIT	I	INTRODU	CTION	TO IOT		(b) = 0 m2 7	10		
Scope	, Relation	with embedo	ded system	ogical trends and future pros n – Basic Architecture of an Iog industrial structure for IoT.	spects – E oT, From N	volution of M2M to IoT,	IoT, M2N	Bus M tow	ne arc
UNIT	II	ELEMENT	S OF IC	T					
UNIT	Ш	COMINION	ICATIC	N AND CONNECTIVE TE	CHNOL(JGIES			
IoT Co	ommunic	ation Model,	Cloud c	omputing in IoT, IoT in clou	ıd architec	ture, loggin	g on	to cl	oud
Selecti	ing and C	creating cloud	service,	omputing in IoT, IoT in cloucloud based IoT platforms— S AND IOT PLATFORM	id architec IBM Watso	ture, loggin on, Google o	g on cloud	to cl	ouc
Selecti UNIT	ing and C IV	DATA ANA	service,	cloud based IoT platforms – I	IBM Watso	on, Google o	loud	l.	
Selecti UNIT Big D	ing and C IV ata Anal	DATA AND options, Apache	service, ALYTIC Hadoop	cloud based IoT platforms - 1	IBM Watso	on, Google o	loud	l.	
Selecti UNIT Big Daniel	ing and C IV ata Anal Data Vi	DATA AND options, Apache	ALYTIC Hadoop	cloud based IoT platforms – IoS AND IOT PLATFORM o, Using Hadoop MapReduction tools for IoT.	IBM Watso	on, Google o	loud	l.	acl
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- 1. Oliver Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Applications and Protocols", Wiley publications.
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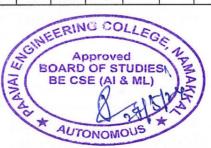
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CO3	3	2	3	2	2	-	-	-	-	-	2	1	3	2
CO4	1	3	2	2	2	-	-	-	-	-	2	1	3	3
CO5	3	2	1	2	2		-	-	-	-	1	1	3	3



COU	RSE OBJECTI	VES				
To ena	able the students	to				
1.	formulate and	l solve Linear I	Programming Problems (LPP).			
2.	evaluate Inte	ger Programm	ing Problems, Transportation and Assign	nment Problem	ıs.	
3.	obtain solution	n to network pro	oblems using CPM and PERT techniques.			
4.	optimize the	function subje	ct to the constraints.			
5.	identify and s	solve problems	s under Markovian queuing models.			
UNIT	I LINE	EAR MODEL	S			9
Introdu	uction of Operat	tions Research	– Mathematical formulation of LPP – G	Graphical Metl	hods to s	solve
LPP –	Simplex Metho	d – Big M met	thod, Two-Phase method.	orupmeur men	ious to t	30110
UNIT	II INTE	GER PROG	RAMMING AND TRANSPORTATION	ON PROBLE	MS	9
History regular	y of Deep Lea rization – batch	rning – A Proposition normalization	robabilistic Theory of Deep Learning n – VC Dimension and Neural Nets-De	- Back prop eep Vs Shallov	pagation w Netwo	and
Convo	lutional Networ	ks- Generative	e Adversarial Networks (GAN), Semi-su	pervised Learn	ning.	
UNIT	III PRO	JECT SCHEI	DULING			9
	erations in PER	T and CPM.	entation – Floats – Critical path meth	lod (CFM) =	PEKI-	
UNIT Uncon	IV CLAS strained problem	T and CPM. SSICAL OPT ns – necessary	IMISATION THEORY and sufficient conditions – Newton-Rap	phson method,		9
UNIT Uncons	Strained problem s – equality co	T and CPM. SSICAL OPT ns – necessary	IMISATION THEORY and sufficient conditions – Newton-Rap quality constraints – Kuhn-Tucker cond	phson method,		9 ined
UNIT Uncons probles UNIT Introdu	strained problem ms – equality co V QUE uction – Queuin ng system – Se	T and CPM. SSICAL OPT Ins – necessary enstraints – ine UING MODE Ins Theory – C	IMISATION THEORY and sufficient conditions – Newton-Rap quality constraints – Kuhn-Tucker cond	phson method, itions.	Constra	9 ined
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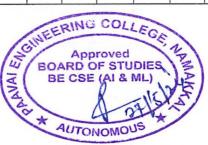
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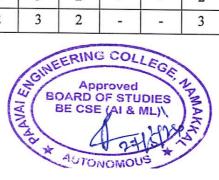
CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

						P	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	2	1	1	-	-	2	-	-	-	2	2	2
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CO3	1	1	1	2	2	-	-	1	-	-	-	2	2	2
CO4	3	2	2	2	1	-	-	1	-	-	-	2	2	1
CO5	1	3	2	3	2	-	-	2	-	-	-	2	1	3



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COU	RSE O	BJEC	TIVES												
To ena	able the	e studei	nts to												
1.	unde	rstand 1	the struc	ctural d	letails o	f Aristo	o-Six ro	bot.							
2.	learn	the bas	sic com	mands	used in	progra	mming								
3.	know	the str	ucture	of robo	t progra	amming	g.								
4.	unde	rstand t	he step	s in ger	neration	of pro	gramm	ing for	differe	nt appli	cations				
LIST	OF EX	(PERI	MENT	S											
1.	Stud	y of Ar	isto six	axis ro	bot.						P-1150				
2.	Stud	y the pr	ogramn	ning co	mmano	ds of A	risto six	axis ro	obot.						
3.	Setup	and p	rogram	a robot	with a	pneum	atic gri	pper fo	r pick a	and place	e oper	ation.			
4.			amming												
5.	Robo	t progr	amming	g and s	imulatio	on for g	grinding	goperat	tion.						
6.	Robo	t progr	amming	g and s	imulatio	on for c	leburrir	ng opera	ation.						-
7.	Robo	t progr	amming	g and si	imulatio	on for a	ssembl	y opera	tion.						
8.	Robo	t progr	amming	g and si	imulatio	on for r	naterial	handli	ng.						
9.	Robo	t progr	amming	g and si	imulatio	on for p	olishin	g of co	mpone	nts.					
10	. Robo	t progr	amming	g and si	imulatio	on for n	niscella	neous	peration	on.					
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COUR	RSE O	UTCO:	MES		= 1										
At the	end of	this co	urse, stu	idents	will be	able to						BT M	lappe	ed	
001												Highe			
CO1			ohysical									Analyz			
CO ₂			suitable ne struc					ration.				Analyz			
CO4			robot pr					ns.				Analyz Analyz			
CO-P							r					maryz	ing (i	(T.	
Mapp	oing of	Cours	e Outco	ome (C	O's) w	ith Pro	gramr	ne Out	comes	(PO's)	and P	rogran	nme	Spe	cific
						Outco	mes (P	SO's)						•	
		((1/2/3 in	idicate	s stren			tion) 3	-Stron	g, 2-Me	edium,	1-We			
CO's	1	2	3	4	_		O's	0	0	10				PSC	
CO1	2	1	2	2	5 2	6	7	8	9	10	11	12	1	_	2
CO2	2	1	2	2	2	-	-	2	1	-	3	1	1	_	2
CO ₃	2	3	1	3	2	-	-	2	1	-	3	1	1	-	2
CO4	2	3	2	3	2	-	-	2	1	-	3	1	2		3
CU4		J		3		-	-	3	1	-	3	1	2		3



CL20	0606	aper of the T	DATA ANALYTICS LABORATORY		0	0	4	2
COU	RSE OBJE	CTIVES	and the second s					
To en	able the stu	dents to						
1.	learn the	different sta	tistical measures and visualization technique	S.				
2.	use differ	ent methods	to test on datasets.					
3.	imply De	cision Tree	and K-Nearest algorithms for the given datas	ets.				
4.	apply I B	ayes method	to analyze the data.					
LIST	OF EXPE	RIMENTS						
1.	Find the	statistical me	easures of central tendency and dispersion su	ch as min(), max	(), me	ean()	,
	median()	, quantile(),	sd(), var() and summary() for real world data	sets.				
2.			erent data visualization techniques. (Scatter P					
		n, Visualiza	tion of Time Series data (Line Graphs) for ap	plications	such	as wea	ather	
	analysis.		LETERONE STUDENT VEN					_
3.	Perform 1	the chi-squar	re test and ANOVA F-test on datasets.			11		
4.	Impleme	nt the PCA n	nethod for dimensionality reduction on datas	ets.				
5.			nethod and show the importance of features.					
6.	Impleme	nt the Decisi	on Tree for given datasets and compute the a	ccuracy of	mode	el.		
7.	Impleme	nt the K-Nea	rest Neighbor Algorithm for given datasets a	nd analyze	the r	esults		
8.	Impleme	nt the I Baye	s method.					
9.	Implemen		ear regression program to predict the future v	alues and	analy	ses the	9	
10			te linear regression program to predict the fu	ture values	anal	vses th	ne	
	goodness					, 505 ti		
11	l. Impleme	ntation of Di	stributed Decision Trees.					
				ТОТА	L PE	RIOD	S	60
COUI	RSE OUT	COMES						
At the	end of this	course, stud	ents will be able to		BT M	appe	d	
				1		st Lev		
CO1	analyze the		tatistical measures and visualization	A	nalyz	ing (K	(4)	
CO2	figure out	different me	ethods to test on datasets.	A	nalyz	ing (K	(4)	
CO3	diagnose algorithm		tasets using Decision Tree and K-Nearest			ing (K		
CO4			es method to analyze the data.	A	nalvz	ing (K	(4)	
					-	0 (-	,	

CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

						PC)'s						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1	3	2	-		-	-	-	-	3	-	3	2
CO2	1	2	3	2	-	-	-	-	-	-	3	-	3	2
CO3	3	2	3	2	-	-	-	-	-	-	3	-	3	2
CO4	1	3	2	2	-	-	-	-	-	-	3	-	3	3



EN206	501	CAR	EER D	EVELO	OPME	NT LA	BORAT	ORY	II	0	0	2 1
COUR	RSE OBJECTIV	VES										
To ena	ble the students	to										
1.	draft resume a	ind enhance t	their ski	lls to ma	anage s	tress to	survive	in corp	orate wo	orld.		
2.	excel in interv	iew skills.										
3.	solve the quar	ntitative aptitu	ude prol	blems an	nd impr	ove the	eir proble	em-sol	ving skil	ls.		
4.	improve their	reasoning ski	ills to g	et placed	d in rep	outed co	mpanies	S.				
UNIT	I RESU	ME WRITI	INGS			Wast	Sto Rotte	ij.				6
and Pit Etiquet Activit	ties: Corporate	Cover Letter Resume Bu	r: Gener	al Guide Session	elines - I- JA	The Co	ontent –	Stress evel II	Manager II- Role	nent-	- Dre	ssing ssion
	dual): Level III-			nalysis S	Session	III- Pe	rsonality	Profil	e Analys	is Se	ssion	III.
UNIT 1		RVIEW SKI										6
Intervie of Inter	ew Skills: Introd views.	uction -Befor	re the In	iterview	– Duri	ng the	Interviev	v – Aft	er the Int	ervie	ew- T	ypes
	ies: Presentation n, Corporate Res				scussio	n Sess	on: Leve	el III, M	lock Inte	rviev	w Pra	ctice
UNIT I		NTITATIVE							-			6
Permut	ation and Combi	ination – Prob	bability:	Dice, Co	olours.	Coin.	Cards: Pa	artners	hip – Age	es – (Calen	dars
UNIT I		CAL REASO							1 -8			6
Making	g Judgments – M	latching Defi	initions -	– Cause	and Ef	fect						
UNIT		CAL REASO			una Di	1001.						6
Direction	ons – Syllogism	– Analogy –	Stateme	ents and	Argun	nents						
2	ene synegiom	, marogj	///	onto ana	riigan	ients.	3	Т	OTAL P	EDI	one	30
COUR	SE OUTCOME	es .	til.	O British (e to ex	BON	127	10	JIALI	EKI	UDS	30
	end of this cours		ill be ab	ole to		T	Ŋ		BT M (Highe			
CO1	construct resum	e and enhance	ce their	etiquette	es.	JA			, ,		ying	(K3)
CO2	demonstrate the	interpersona	al skills	in group	discus	ssions.				Appl	ying	(K3)
CO3	compute proble	ms based on	quantita	ative apti	itude.					Appl	ying	(K3)
CO4	expose their lo	gical and ver	rbal reas	soning b	y scor	ing the	expecte	d		Appl	ying	(K3)
	percentage to ge	et placed in re	eputed of	companie	ies.						n = 0.576	m 82%
	BOOKS							1000 To				
1.	Agarwal, R. S, New Delhi.201		pproach	to Verb	oal and	Non V	erbal Re	asonin	g", S.Ch	and &	& Co	Ltd,
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-	, , , , , , ,	J			,							

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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

				8		Pe	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	3	3	1	-	-	-	-	-	(-	3	2
CO2	-	2	3	-	2	-	2	-	-	=	-	-	3	2
CO3	3	2	2	2	-	-	1	-	-		-	-	2	3
CO4	3	2	2	-	-	1	-	-	-	-	2	-	2	3



PROFESSIONAL ELECTIVE – I

CL20	151		CYBER SECURITY		3 0	0	3
COU	RSE OBJECT	TIVES					
To ena	able the stude	nts to					
1.	know the fu	ndamental math	ematical concepts related to security.				
2.	learn the co	ncepts of variou	s cryptographic techniques.				
3.	know the fu	ndamentals of c	ybercrimes and the cyber offenses.				
4.	understand	the integrity and	authentication process.				
5.	familiarize policies and		threats, attacks, vulnerabilities, defens	ive mechani	sms, s	ecui	rity
UNIT	I IN	TRODUCTION	N TO NUMBER THEORY				9
Finite	Fields and N	Number Theory:	Modular arithmetic – Euclidian Algor	rithm – Prim	ality T	esti	ng:
			ese Reminder theorem – Discrete Logarit				U
UNIT		YPTOGRAPH THENTICATI	IIC TECHNIQUES, AND INTEGRITY	Y &			9
Symm	etric key Cry	ptographic Tech	nniques: Introduction to Stream cipher, I	Block cipher:	DES,	AES	S –
Asymr	netric key Cry	yptographic Tec	hniques: Principles RSA, Elliptic Curve o	ryptography	(ECC)	- Ha	ash
functio	ons – Secure I	Hash Algorithm	(SHA) - Message Authentication Code (MAC).			
UNIT	III CY	BER CRIMES	AND CYBER OFFENCES			T	9
Classif	fication of cyl	bercrimes, planner I and Cyber-c	ning of attacks, social engineering: Huma	an based, Co	mputer	bas	ed:
UNIT			TS, ATTACKS AND PREVENTION			T	9
Phishir Theft (ng, Password (ID): Types of	cracking, Keylo Identity Theft,	ggers and Spywares, DoS and DdoS attac Techniques of ID theft.	cks, SQL Inje	ection I	dent	ity
UNIT			TY POLICIES AND PRACTICES				9
Securit policie	ty Policies: Des, Compliance	etermining the e and Enforceme	policy needs, writing security policies, lent of policies, Review.	Internet and	email s	ecur	ity
				TOTAL PI	ERIOD	s	45
COUR	RSE OUTCO	MES	> -				
At the	end of this co	urse, students w	rill be able to	BT M (Highes	apped st Leve	D	
CO1	associate the	fundamental m	athematical concepts related to security.	-	standin	,	(2)
CO2	adapt the co		ous cryptographic techniques, and its		Applyin	_	
CO3	classify the	fundamentals of	cybercrimes and the cyber offenses.	F	Applyin	g (K	(3)
CO4	customize th	ne integrity and a	authentication process.		Applyin		-
CO5	investigate v		reats, attacks, vulnerabilities, defensive			-	

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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

		•				P	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	1	1	-	-	-	-	-	-	-	1	3	3
CO2	2	1	1	1	-	-	-	-	-	-	-	1	3	3
CO3	3	2	1	1	-	2	-	-	-	-	-	1	3	1
CO4	2	2	1	1	-	-	-	-	-	-	<u>-</u>	1	3	1
CO5	3	2	1	1	-	2	-	-	-	-	-	1	3	2



CL20											
COU	RSE OBJ	ECTIV	ES								_
To ena	able the st	udents to	0								
1.	understa	and the o	different w	ways	for extractio	n of multime	dia data.				
2.	learn an	d explor	re the info	orma	tion extractio	n techniques					
3.	apply th	e inform	nation retr	rieva	al algorithms	for real time	application	s.			
4.	understa	and the a	algorithms	s of	information re	etrieval techi	niques.				
5.	understa	and the r	ole of info	forma	ation retrieval	l systems in r	eal-time ap	plications.			
UNIT	I	INTRO	DUCTIO	ON '	TO INFORM	MATION EX	TRACTIO	ON			T
Introd	uction – (Origins -	- Text. Aı	udio	, Image, Vide	eo Extraction	ı – Visual o	hiect Featu	re Loca	aliza	tion
					shape Extract						
using.	Audio & V	Video –	Multimed	dia V	Veb Documen	its.					
UNIT			EXTRAC								
Pre-pr	ocessing	Techniqu	ues – Clus	ısteri	ng – Probabi	listic Model	s – Browsir	ng and Quer	y Refin	neme	nt c
presen					Visualization		and its Ope	erations.	767		
UNII	ш	INFOR	CVIATIO	IN K	ETRIEVAL	SYSTEMS					
Inverte Classi – XMI UNIT	ed Indices fiers – Pro L Retrieva	s – Dyn babilist al. ALGO	namic Invic, Linear,	verte r, Sir	g — Evaluation of Indices — milarity based	Index comp	ression – 0 d Linear, In	Categorizati nformation	on and Theoret	Filt	ode
Inverte Classii – XMI UNIT Introde Utilitie	ed Indices fiers – Pro L Retrieva IV uction – Ses – Effices	s - Dyn bbabilisti al. ALGO Strategie ciency N	namic Invice, Linear, RITHMS s – Utiliti	verter, Sir	d Indices – milarity based	Index comp d, Generalize TION RET	ression – (d Linear, In RIEVAL parrier- Cro	Categorizati nformation '	on and Theoret	File File File File File File File File	ode wit
Inverte Classi: – XMI UNIT Introde Utilitie Inform	ed Indices fiers – Pro L Retrieva IV uction – S es – Efficient	s – Dyn obabilist al. ALGO Strategie ciency M	namic Invice, Linear, RITHMS s – Utiliti Multidime	verte r, Sir S ON ties -	d Indices – milarity based NINFORMA – Crossing th	Index comp d, Generalize TION RET	ression – (d Linear, In RIEVAL parrier- Cro	Categorizati nformation '	on and Theoret	File File File File File File File File	terir
Inverte Classii – XMI UNIT Introde Utilitie	ed Indices fiers – Pro L Retrieva IV uction – S es – Efficient	s – Dyn obabilist al. ALGO Strategie ciency M	namic Invice, Linear, RITHMS s – Utiliti	verte r, Sir S ON ties -	d Indices – milarity based NINFORMA – Crossing th	Index comp d, Generalize TION RET	ression – (d Linear, In RIEVAL parrier- Cro	Categorizati nformation '	on and Theoret	File File File File File File File File	terir ode wi
Inverted Classic – XMI UNIT Introductilities Inform UNIT Sound System	ed Indices fiers – Pro L Retrieva IV uction – S es – Efficiention Retrieva V Authorin ns – Parali	s - Dyn bbabilist al. ALGO Strategie ciency M rieval. APPLI g Data v nguistic	namic Invice, Linear, RITHMS s — Utiliti Multidime CATION with Audi Informati	S ON ties - ensio	d Indices – milarity based NINFORMA – Crossing th	Index comp d, Generalize TION RET le language l del – Parall Systems – In roadcast – Te	ression – Od Linear, In RIEVAL Darrier- Cro el Informat mplementat ext mining A	categorizati information / oss Language tion Retriev ion of Mess	on and Theoret ge strate val – D sage Re – Pre-p	Filling Fillin	witte
Inverted Classic – XMI UNIT Introductilities Inform UNIT Sound System Applic	ed Indices fiers – Pro L Retrieva IV uction – S es – Effic nation Retrieva V Authorin ns – Parali cations usi	s – Dynobabilistial. ALGO Strategie eiency Mrieval. APPLI g Data vinguisticing Proba	namic Invice, Linear, RITHMS S — Utilitic Multidiment CATION with Audi Informati abilistic and the second control of the second con	S ON ties - ensio	d Indices – milarity based NINFORMA - Crossing the mal data model MME – CBR Retrieval in Br	Index comp d, Generalize TION RET le language l del – Parall Systems – In roadcast – Te	ression – Od Linear, In RIEVAL Darrier- Cro el Informat mplementat ext mining A	Categorizati information oss Language tion Retriev ion of Mess	on and Theoret ge strate val – D sage Re – Pre-p	Filling Fillin	win
Inverte Classi: - XMI UNIT Introdu Utilitie Inform UNIT Sound System Applic	ed Indices fiers – Pro L Retrieva IV uction – Ses – Effic nation Retrieva Authorin ns – Parali cations usi	s - Dynobabilistial. ALGO Strategie ciency Mrieval. APPLI g Data vinguistic ng Proba	namic Invice, Linear, RITHMS s — Utiliti Multidiment CATION with Audi Informati abilistic an	verte r, Sir S ON titles titles titles MS	d Indices — milarity based INFORMA - Crossing the mal data moderate ME — CBR Retrieval in Br Hybrid Approx	Index comp d, Generalize TION RET le language l del – Parall Systems – In roadcast – Te	ression – Od Linear, In RIEVAL Darrier- Cro el Informat mplementat ext mining A	categorizati nformation / oss Languag tion Retriev ion of Mess Applications TOTAL	on and Theoret ge strate val – D sage Re – Pre-p	Filling Fillin	win
Inverte Classi: - XMI UNIT Introdu Utilitie Inform UNIT Sound System Applic	ed Indices fiers – Pro L Retrieva IV uction – Ses – Effic nation Retrieva Authorin ns – Parali cations usi	s - Dynobabilistial. ALGO Strategie ciency Mrieval. APPLI g Data vinguistic ng Proba	namic Invice, Linear, RITHMS s — Utiliti Multidiment CATION with Audi Informati abilistic an	verte r, Sir S ON titles titles titles MS	d Indices – milarity based NINFORMA - Crossing the mal data model MME – CBR Retrieval in Br	Index comp d, Generalize TION RET le language l del – Parall Systems – In roadcast – Te	ression – Od Linear, In RIEVAL Darrier- Cro el Informat mplementat ext mining A	categorizati nformation oss Languag tion Retriev ion of Mess Applications TOTAL	on and Theoret ge strate val – E sage Re – Pre-p	Filli	with
Inverted Classi: - XMI UNIT Introductilities Inform UNIT Sound System Applic COUF At the	ed Indices fiers – Pro L Retrieva IV uction – Ses – Effication Retrieva Authorinas – Parali cations usi RSE OUT end of thi	s - Dynobabilistial. ALGO Strategie ciency Marieval. APPLI g Data was nguistic ng Proba	namic Invice, Linear, RITHMS s – Utiliti Multidiment CATION with Audi Informati abilistic and	verte r, Sin S ON ties - ensio MS lio M tion I and H	d Indices — milarity based INFORMA - Crossing the mal data moderate ME — CBR Retrieval in Br Hybrid Approx	Index comp d, Generalize TION RET te language l del – Parall Systems – In roadcast – Te aches – Web	ression – Od Linear, In RIEVAL Darrier- Croel Informate mplementate ext mining A Search.	categorizati information of Mess ion of Mess Applications TOTAL BT (Higher)	on and Theoret ge strate val – D sage Re – Pre-p	Filities music mus	witionitions sin
Inverted Classi: - XMI UNIT Introductilities Inform UNIT Sound System Applic COUF At the	ed Indices fiers – Pro L Retrieva IV uction – S es – Efficient on Retrieva V Authorin ns – Parali cations usi RSE OUT end of thi classify application	s - Dynobabilistical. ALGO Strategie ciency Marieval. APPLI g Data vanguisticang Probabilisticang Probab	namic Invice, Linear, RITHMS s — Utiliti Multidiment CATION with Audi Informati abilistic and s, students formation	verte r, Sin S ON ties - ensio NS lio M tion F and F	d Indices — milarity based INFORMA - Crossing the mal data moderate and data modera	Index comp d, Generalize TION RET the language of the langua	ression — (d Linear, In RIEVAL parrier- Cro el Informat mplementat ext mining A Search.	categorizati information ass Language ion Retriev ion of Mess Applications TOTAL BT (Hig	on and Theoret ge strate val – D sage Re – Pre-p PERI	Filling Fillin	wition wition wition (K2
Inverte Classi: - XMI UNIT Introdu Utilitie Inform UNIT Sound System Applic COUF At the	ed Indices fiers – Pro L Retrieva IV uction – S es – Effic nation Retr V Authorin ns – Parali cations usi RSE OUT end of thi classify applicati customiz	s — Dynobabilistial. ALGO Strategie ciency Marieval. APPLI g Data was nguistic ng Probase course the initions. Ze system	RITHMS s — Utiliti Multidiment CATION with Audi Informati abilistic and s, students formation ms based of	S ON	d Indices — milarity based NINFORMA — Crossing the mal data moderate and data modera	Index comp d, Generalize TION RET The language in del — Parall Systems — In roadcast — Te aches — Web The hniques for finformation	ression — (d Linear, In RIEVAL parrier- Cro el Informat mplementat ext mining A Search.	categorizati information ass Language ion Retriev ion of Mess Applications TOTAL BT (Hig	on and Theoret ge strate val – D sage Re – Pre-p PERI Mapp chest Le derstan	Filities music mus	witto
Inverte Classi: - XMI UNIT Introdu Utilitie Inform UNIT Sound System Applic	ed Indices fiers – Pro L Retrieva IV uction – Ses – Effice nation Retrieva Authorin ms – Parali cations usi RSE OUT end of thi classify application apply da	s - Dynobabilistial. ALGO Strategie ciency Mrieval. APPLI g Data winguistic ng Probasic s course the inions. ze systemata specificata sp	RITHMS s — Utiliti Multidiment CATION with Audi Informati abilistic an formation ms based of	s ON ties t	d Indices — milarity based NINFORMA — Crossing the mal data model MME — CBR Retrieval in Br Hybrid Approx I be able to extraction technic concepts of	Index comp d, Generalize TION RET The language of the langua	ression — (d Linear, In RIEVAL parrier- Cro el Informat mplementat ext mining A Search.	categorizati information ass Language ion Retriev ion of Mess Applications TOTAL BT (Hig	on and Theoret ge strate yal – D sage Re – Pre-p PERI Mapp hest Le derstan Appl	File File File File File File File File	wittoute (K2 (K3 (K3

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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

					*	P	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	1	1	-	-	-	1	2	1	2	2	1
CO2	3	2	3	1	1	-	-	-	1	2	1	3	1	2
CO3	3	3	3	1	3	-	-	-	1	2	1	2	2	1
CO4	3	3	3	1	3	-	-	-	1	2	1	2	2	1
CO5	3	3	2	1	3	-	-	-	1	3	1	3	1	3



CL20	123					JD IIIICI	HINE L				3	0	
COU	RSE OBJ	JECTIVI	ES										
To ena	able the s	tudents to)										
1.	learn ac	dvanced r	nachine	learni	ng conce	pts.							
2.	underst	tand the k	nowledg	e rep	esentatio	n.							
3.	underst	tand the c	redibility	/.									
4.	underst	and tress	and rule	s.									-
5.	make w	vork of ma	achine le	arnin	g tools.								
UNIT	I	INTRO	DUCTI	ON									T
Search	n, Data N ledge rep	Mining an	d Ethics	s, Inp	ut: conce	ss, Machi epts, insta dels, Tree	nces, at	tributes	, Prepar	ring the	Inpu	t, oi	ıtp
UNIT	II	KNOW	LEDGE	REI	RESEN	TATION							Ť
Linear	Models	Instance	Rased I	overii	ig Algori	ithms: Co	nstructii	ng Rule	s, Mini	ng Asso	ciati	on K	Lule
UNIT Trainin Selecti	Models, III ng and T ion, Com	CREDI Cesting, Paparing D	Based L BILITY redicting ata Mini	g Peri	ormance	, Cross-V	Multi-In	n, Othe	Learning r Estima Counting	g. ates, Hy	per p	oarar Valu	net atir
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CO4	employ different machine learning tools for implementing real-	Applying (K3)
	world applications.	11 5 8 7
CO5	demonstrate the concepts of Machine Learning Tools.	Applying (K3)

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- 2. "Machine Learning: The art of science and algorithms that make sense of data", Peter A. Flach, 1st Edition, Cambridge University Press, 2012.

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- 3. John Hearty, "Advanced Machine Learning with Python", Packt Publishing, 2016, ISBN-13: 978-1784398637.
- 4. Dr.Reema Thareja, "Data Science and Machine Learning using Python", McGraw Hill, Standard Edition, 2022. ISBN-13: 978-9355322142.

CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

						P	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	2	1	-	-	3	-	-	-	2	2	1
CO2	3	2	3	2	1	-	- 1	2	-	-	-	- 3	1	2
CO3	2	3	3	2	3	-	-	1	-	-	-	2	2	1
CO4	2	3	3	2	3	-	-	1	-	-	-	2	2	1
CO5	3	3	2	2	2	-	-	3	-	-	-	3	1	3



COIT			RE INSPIRED COMPUTING TECH	NIQUES 3 0	0 0 3
COOL	RSE OBJECTI	VES			
To ena	able the students	to			
1.	understand the	fundamenta	ls of nature inspired techniques.		
2.	gain knowledg	ge in inspired	computing by nature.		
3.	understand Sw	arm Intellige	ence.	-	
4.	study the Imm	uno-computi	ng techniques.		
5.			natural materials.		
UNIT	T	ODUCTION			9
From			Philosophy, Three Branches: A Brief Ov	verview Individuals	Entitios
			istributive Interactivity, Adaptation I		
			n-up Vs Top-Down- Determination, Ch		inzation
UNIT			SPIRED BY NATURE		9
Evolut	tionary Computin	ng, Hill Clim	bing and Simulated Annealing, Darwin	's Dangerous Idea. (3enetics
				eproduction – Cro	
Mutati			ng Genetic Programming.		
UNIT	III SWAI	RM INTELI	LIGENCE		9
ACO a	uction – Ant Co algorithms, Ant (lonies, Ant F Colony Algor	Foraging Behavior, Ant Colony Optimi ithm (ACA), Swarm Robotics, Foraging	zation, SACO and s	cope of
of Kno				5 for food, booth fide	aptation
			mization (PSO).	5 101 1000, 500141 7141	aptation
UNIT		Swarm Opti		5 101 1004, 500141 714	9
UNIT	IV IMMU	UNO COMP	UTING		9
UNIT	IV IMMU	UNO COMP System, Phy	VITING Visiology and main components Pattern	n Recognition and E	9 Binding,
UNIT Introdu Immur	IV IMMO uction- Immune ne Network Theo	System, Phy ory – Danger	UTING	n Recognition and E	9 Binding,
UNIT Introdu Immur	IV IMMO uction- Immune ne Network Theo c algorithms, Bo	System, Phyory – Danger one Marrow N	Viology and main components Pattern Theory, Evaluation Interaction Immune	n Recognition and E e Algorithms, Introdu nmune Networks.	9 Binding,
Introdu Immur Geneti UNIT	IV IMMO uction- Immune ne Network Theo ic algorithms, Bo V COM	System, Phyory – Danger one Marrow M	VITING Visiology and main components Pattern Theory, Evaluation Interaction Immuno Models, Forest's Algorithm Artificial Im ITH NEW NATURAL MATERIALS	n Recognition and E e Algorithms, Introdu nmune Networks.	9 Binding, uction –
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Introdu Immur Geneti UNIT DNA (Univer of DNA	IV IMMO uction- Immune ne Network Theo c algorithms, Bo V COM Computing: Moti rsal DNA Comput A Computing, Fr	System, Phyory – Danger one Marrow Marrow Marrow Marrow Marrow Marrow Marrow Marrow Marrow, DNA System, PAM Marom Classical	visiology and main components Pattern Theory, Evaluation Interaction Immune Models, Forest's Algorithm Artificial Im ITH NEW NATURAL MATERIALS Molecule Adleman's experiment, Test Model Splicing Systems, Lipton's Solut	n Recognition and E e Algorithms, Introdu nmune Networks.	9 Sinding, auction – 9 nguage, a, Scope
Introdu Immur Geneti UNIT DNA C Univer of DNA	IV IMMO uction- Immune ne Network Theo ic algorithms, Bo V COM Computing: Moti rsal DNA Comput A Computing, Fr	System, Phyory – Danger one Marrow Marrow Marrow Marrow Marrow Marrow Marrow Marrow Marron, DNA one Classical	vsiology and main components Pattern Theory, Evaluation Interaction Immune Models, Forest's Algorithm Artificial Immune ITH NEW NATURAL MATERIALS Molecule Adleman's experiment, Test of Model Splicing Systems, Lipton's Solutto DNA Computing.	n Recognition and E e Algorithms, Introdumune Networks. tube programming lation to SAT Problem	Binding, auction – 9 nguage, a, Scope DS 45
Introdu Immur Geneti UNIT DNA C Univer of DNA	IV IMMO uction- Immune ne Network Theo c algorithms, Bo V COM Computing: Moti rsal DNA Comput A Computing, Fr	System, Phyory – Danger one Marrow Marrow Marrow Marrow Marrow Marrow Marrow Marrow Marron, DNA one Classical	vsiology and main components Pattern Theory, Evaluation Interaction Immune Models, Forest's Algorithm Artificial Immune ITH NEW NATURAL MATERIALS Molecule Adleman's experiment, Test of Model Splicing Systems, Lipton's Solutto DNA Computing.	n Recognition and Est Algorithms, Introdumune Networks. Itube programming lation to SAT Problem TOTAL PERIOR	Binding, suction – 9 nguage, a, Scope DS 45
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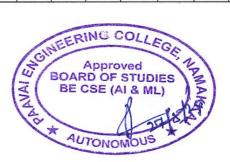
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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

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					2	P	O's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	1	2	3	2	-	-	-	-	2	2	1
CO2	3	2	3	1	2	2	2	-	-	-	-	3	1	2
CO3	2	3	3	3	2	1	2	-	-	-	-	2	2	1
CO4	2	3	3	3	2	2	2	-	-	-	-	2	2	1
CO5	3	3	2	2	2	3	3	-	-	-	-	3	1	3



PROFESSIONAL ELECTIVE – II

CL20251 ENGINEERING PREDICTIVE ANALYTICS 3 0 0								3	
COU	RSE OBJECTIV	VES							
To ena	able the students	to							
1.	explain termino	ology, techno	ogy and application	s of predictive anal	ysis.		4.5.0		
2.	apply data prep	paration techn	ques and generate a	ppropriate associat	ion rules.				
3.	discuss various	descriptive n	odels, their merits,	demerits and appli	cation.				-
4.	describe variou	s predictive r	nodelling methods.						
5.	cycle.								
UNIT	I INTR	ODUCTION	TO PREDICTIVI	E ANALYTICS	14 5 - 12				9
Data V	Visualization in (ical Significance	One Dimensi - Pulling It A	Setting Up the Proon- Data Visualizati l Together into a Da FION AND ASSO	on, Two or Higher ta Audit.	Dimensions-				
Param Rules-	Preparation – Var eter Settings- Ho Problems with A	riable Cleanin ow the Data Is Association R	g- Feature Creation- Organized- Measur ules- Building Class	Item sets and Assores of Interesting R	ociation Rules ules- Deployir	ng As	ssoc	olog	gy-
UNIT	III MOD	ELLING							9
Descri	ptive Modeling	- Data Prep	aration Issues with	Descriptive Models	eling- Principa	al Co	omp	on	ent
Analys Interpr	retation. IV PRED	Algorithms-	Interpreting Des	criptive Models-	Standard C	luste	r]	Mo	del 9
Analys Interpr UNIT Decision	retation. IV PRED on Trees – Logi	Algorithms- PICTIVE MO	Interpreting Des	criptive Models- k Model – K-Nea	Standard C	luste	r]	Mo	del 9
Analys Interpr UNIT Decision	retation. IV PRED on Trees – Logicsion Models – L	Algorithms- PICTIVE MO	Interpreting Des	criptive Models- k Model – K-Nea	Standard C	luste	r]	Mo	del 9
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Analysi Interprite UNIT Decisi Regress UNIT Motiva Unstrument To COUF At the	retation. IV PRED on Trees – Logission Models – L V TEXT ation for Text I actured Data- Wh ext Mining Featured of this cours explain terminal analysis. summarize data	Algorithms- DICTIVE MO Istic Regression in ear Regress MINING Mining — A by Text Mining Mines — Regular ES be, students we ology, techn a preparation	Interpreting Des DELLING On -Neural Network ion - Other Regress Predictive Modeling Is Hard- Data Prep Expressions - Case Il be able to plogy and applicate echniques.	k Model – K-Nea ion Algorithms. g Approach to Tearation Steps- Texter Studies: Survey A	ext Mining- ext Mining Featurallysis. TOTAL P BT M (Higher Under	Struc ERIO Iapp st Le	I Batture	Modeling (K	9 ss - 9 vvs. sing 45
Analysi Interprite UNIT Decision Regress UNIT Motiva Unstrument To COUF At the	retation. IV PRED on Trees – Logical Sision Models –	Algorithms- OICTIVE MO istic Regressi inear Regress MINING Mining – A y Text Minin ires – Regular ES e, students w ology, techn a preparation s descriptive	Interpreting Des DELLING On -Neural Network ion - Other Regress Predictive Modeling Is Hard- Data Prep Expressions - Case Il be able to Dology and applicat	k Model – K-Nea ion Algorithms. g Approach to Tolaration Steps- Text e Studies: Survey A	ext Mining-sext Mining Featurnalysis. TOTAL P. BT M. (Highe) Under	Structures- I I I I I I I I I I I I I I I I I I I	r] Ba	Modeling (K	9 s - 9 vvs. sing 45 (22)

CO5	elaborate the features and applications of text mining.	Understanding
		(K2)

- Mangey Ram, Vijay Kumar, "Predictive Analytics: Modelling and Optimization", CRC Press, 1st Edition, 2021. E-Book ISBN: 9781003083177.
- 2. Krishna Kumar Mohbey, Arvind Pandey, Dharmendra Singh Rajput, "Predictive Analytics Using Statistics and Big Data: Concepts and Modeling", Betham Books, 2020. ISBN-13: 978-9811490507.

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- 2. Dean Abbott, "Applied Predictive Analytics-Principles and Techniques for the Professional Data Analyst", Wiley, 2014.
- 3. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.
- 4. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, "An Introduction to Statistical Learning with Applications in R", Springer, 2013.

CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

	1						O's		8,		,		PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	2	1	1	-	-	2	-	-	-	2	2	2
CO2	1	2	1	1	2	-	-	2	-	-	-	2	1	2
CO3	1	1	1	2	2	-	-	1		-	-	2	2	2
CO4	3	2	2	2	1	-	-	1	-	-	-	2	2	1
CO5	1	3	2	3	2	-	-	2	-	-	-	2	1	3



Feature Extraction – Edges – Canny, LOG, DOG – Line detectors (Hough Transform), Corners – Harrand Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters – Gabor Filters and DWT – Image Segmentation – Regic Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation. UNIT III IMAGES, HISTOGRAMS, BINARY VISION Simple pinhole camera model – Sampling – Quantization – Colour images – Noise – Smoothing – Il and 3D histograms – Histogram/Image Equalization – Histogram Comparison – Back-projection – Means Clustering – Thresholding – Threshold Detection Methods – Variations on Thresholding Mathematical Morphology – Connectivity. UNIT IV 3D VISION AND MOTION Methods for 3D vision – Projection schemes – Shape from shading – Photometric stereo – Shape from texture – Shape from focus – Active range finding – Surface representations – Point-based representation – Volumetric representations – 3D Object recognition – 3D Reconstruction – Introduction to motion Triangulation – Bundle adjustment – Translational alignment – Parametric motion – Spline-based motion – Optical flow – Layered motion. UNIT V APPLICATIONS Overview of Diverse Computer Vision Applications: Document Image Analysis – Biometrics – Object Recognition – Tracking – Medical Image Analysis – Content-Based Image Retrieval – Video Date Processing – Virtual Reality and Augmented Reality. TOTAL PERIODS 4 COURSE OUTCOMES At the end of this course, students will be able to BT Mapped (Highest Level)	CL202	52		COMPUTER VISION		3	0 0	3
1. review the basics of image processing techniques for computer vision. 2. understand various features and segmentation techniques. 3. learn about images, histogram and binary vision. 4. apply three-dimensional image analysis techniques. 5. study real world applications of computer vision algorithms. UNIT I INTRODUCTION Image Processing, Computer Vision, what is Computer Vision — Low-level, Mid-level, High-leve Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing. UNIT II FEATURE EXTRACTION AND FEATURE SEGMENTATION Feature Extraction — Edges — Canny, LOG, DOG — Line detectors (Hough Transform), Corners — Harr and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters — Gabor Filters and DWT — Image Segmentation — Regio Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Textus Segmentation. UNIT III IMAGES, HISTOGRAMS, BINARY VISION Simple pinhole camera model — Sampling — Quantization — Colour images — Noise — Smoothing — Il and 3D histograms — Histogram/Image Equalization — Histogram Comparison — Back-projection — Imeans Clustering — Thresholding — Threshold Detection Methods — Variations on Thresholding Mathematical Morphology — Connectivity. UNIT IV 3D VISION AND MOTION Methods for 3D vision — Projection schemes — Shape from shading — Photometric stereo — Shape from focus — Active range finding — Surface representations — Point-based representation — Volumetric representations — 3D Object recognition — 3D Reconstruction — Introduction to motion Triangulation — Bundle adjustment — Translational alignment — Parametric motion — Spline-based motio — Optical flow — Layered motion. UNIT V APPLICATIONS Overview of Diverse Computer Vision Applications: Document Image Analysis — Biometrics — Object Recognition — Tracking — Medical Image Analysis — Content-Based Image	COUR	SE OBJECTIV	VES			lJ.		
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4. apply three-dimensional image analysis techniques. 5. study real world applications of computer vision algorithms. UNIT I INTRODUCTION Image Processing, Computer Vision, what is Computer Vision – Low-level, Mid-level, High-leve Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, Fourit Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing. UNIT II FEATURE EXTRACTION AND FEATURE SEGMENTATION Feature Extraction – Edges – Canny, LOG, DOG – Line detectors (Hough Transform), Corners – Harr and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters – Gabor Filters and DWT – Image Segmentation – Regio Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation. UNIT III IMAGES, HISTOGRAMS, BINARY VISION Simple pinhole camera model – Sampling – Quantization – Colour images – Noise – Smoothing – It and 3D histograms – Histogram/Image Equalization – Histogram Comparison – Back-projection – Image Scustering – Thresholding – Threshold Detection Methods – Variations on Thresholding Mathematical Morphology – Connectivity. UNIT IV 3D VISION AND MOTION Methods for 3D vision – Projection schemes – Shape from shading – Photometric stereo – Shape from texture – Shape from focus – Active range finding – Surface representations – Point-based representation – Volumetric representations – 3D Object recognition – 3D Reconstruction – Introduction to motion Triangulation – Bundle adjustment – Translational alignment – Parametric motion – Spline-based motion – Optical flow – Layered motion. UNIT V APPLICATIONS Overview of Diverse Computer Vision Applications: Document Image Analysis – Biometrics – Object Recognition – Tracking – Medical Image Analysis – Content-Based Image Retrieval – Video Dat Processing – Virtual Reality and Augmented Reality. TOTAL PERIODS 4 COURSE OUTCOMES At the end of this course, students will be able to BT Ma	2.	understand va	rious features	and segmentation techniques.				
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Introduction Image Processing, Computer Vision, what is Computer Vision – Low-level, Mid-level, High-leve Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, Fouritransform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing. UNIT II FEATURE EXTRACTION AND FEATURE SEGMENTATION Feature Extraction – Edges – Canny, LOG, DOG – Line detectors (Hough Transform), Corners – Harr and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters – Gabor Filters and DWT – Image Segmentation – Regic Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Textus Segmentation. UNIT III IMAGES, HISTOGRAMS, BINARY VISION Simple pinhole camera model – Sampling – Quantization – Colour images – Noise – Smoothing – Il and 3D histograms – Histogram/Image Equalization – Histogram Comparison – Back-projection – Beack-projection – Projection Sentence – Shape from shading – Photometric stereo – Shape from texture – Shape from focus – Active range finding – Surface representations – Point-based representation – Volumetric representations – 3D Object recognition – 3D Reconstruction – Introduction to motion Triangulation – Bundle adjustment – Translational alignment – Parametric motion – Spline-based motion – Optical flow – Layered motion. UNIT V APPLICATIONS Overview of Diverse Computer Vision Applications: Document Image Analysis – Biometrics – Object Recognition – Tracking – Medical Image Analysis – Content-Based Image Retrieval – Video Dat Processing – Virtual Reality and Augmented Reality. TOTAL PERIODS 4 COURSE OUTCOMES At the end of this course, students will be able to BT Mapped (Highest Level)	4.	apply three-di	mensional in	age analysis techniques.				
Image Processing, Computer Vision, what is Computer Vision – Low-level, Mid-level, High-leve Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, Fourit Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing. UNIT II FEATURE EXTRACTION AND FEATURE SEGMENTATION Feature Extraction – Edges – Canny, LOG, DOG – Line detectors (Hough Transform), Corners – Harr and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters – Gabor Filters and DWT – Image Segmentation – Regio Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation. UNIT III IMAGES, HISTOGRAMS, BINARY VISION Simple pinhole camera model – Sampling – Quantization – Colour images – Noise – Smoothing – It and 3D histograms – Histogram/Image Equalization – Histogram Comparison – Back-projection – Images Clustering – Thresholding – Threshold Detection Methods – Variations on Thresholding Mathematical Morphology – Connectivity. UNIT IV 3D VISION AND MOTION Methods for 3D vision – Projection schemes – Shape from shading – Photometric stereo – Shape from texture – Shape from focus – Active range finding – Surface representations – Point-based representation – Volumetric representations – 3D Object recognition – 3D Reconstruction – Introduction to motion Triangulation – Bundle adjustment – Translational alignment – Parametric motion – Spline-based motio – Optical flow – Layered motion. UNIT V APPLICATIONS Overview of Diverse Computer Vision Applications: Document Image Analysis – Biometrics – Object Recognition – Tracking – Medical Image Analysis – Content-Based Image Retrieval – Video Dat Processing – Virtual Reality and Augmented Reality. TOTAL PERIODS 4 COURSE OUTCOMES At the end of this course, students will be able to BT Mapped (Highest Level)	5.	study real wor	rld application	ns of computer vision algorithms.				1
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Overview of Diverse Computer Vision Applications: Document Image Analysis – Biometrics – Object Recognition – Tracking – Medical Image Analysis – Content-Based Image Retrieval – Video Date Processing – Virtual Reality and Augmented Reality. TOTAL PERIODS 4 COURSE OUTCOMES At the end of this course, students will be able to BT Mapped (Highest Level)	texture - Volum Triangu - Optic	 Shape from formetric representation – Bundle al flow – Layer 	eations – 3D (adjustment –	range finding – Surface representations – Object recognition – 3D Reconstruction	Point-based r – Introduction	epre	senta moti	tion on –
Recognition – Tracking – Medical Image Analysis – Content-Based Image Retrieval – Video Date Processing – Virtual Reality and Augmented Reality. TOTAL PERIODS 4 COURSE OUTCOMES At the end of this course, students will be able to BT Mapped (Highest Level)	UNIT	V APPL	ICATIONS	A 7 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -				9
At the end of this course, students will be able to BT Mapped (Highest Level)	Recogn	ition - Trackin	g - Medical	Image Analysis - Content-Based Imag	ysis – Biome ge Retrieval –	trics - Vi	– Ob deo I	oject Data
At the end of this course, students will be able to BT Mapped (Highest Level)					TOTAL PE	ERIC	DDS	45
(Highest Level)								
CO1 implement image processing techniques for computer vision. Applying (K3			**					
								K3)

explain various feature extraction, segmentation and object	Applying (K3)
recognition methods.	
examine the images, histogram and binary vision.	Applying (K3)
handle histogram transforms for detection of geometric shapes like	Applying (K3)
line, ellipse and objects.	
simulate 3D vision process and motion estimation techniques.	Applying (K3)
	recognition methods. examine the images, histogram and binary vision. handle histogram transforms for detection of geometric shapes like line, ellipse and objects.

- 1. Steve Holden, "Computer Vision: Advanced Techniques and Applications", Clanrye International, 2019.
- 2. E.R. Davies, "Computer Vision: Principles, Algorithms, Applications, Learning", Academic Press, 2017.

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- 2. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press, 2012.
- 3. Scott Krig, "Computer Vision Metrics: Survey, Taxonomy and Analysis", Apress Berkeley, CA, 2014.
- 4. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer Verlag London Limited, 2011.

CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

						P	O's			*			PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	2	1	-	-	1	-	-	1	2	2	1
CO2	3	2	3	2	1	-	-	1	-	-	1	2	1	2
CO3	2	3	3	2	3	-	-	1	-	-	1	2	2	1
CO4	2	3	3	2	3	-	-	1	-	-	1	2	2	1
CO5	3	3	3	2	2	-	-	1	-	-	1	3	1	3



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COU	RSE OBJ	JECTIV	ES								
To en	nable the st	tudents	to			-0					
1.	unders	stand the	basics o	f Blo	ckchain Technology.						
2.	analyz	e the me	echanism	of d	gital money and Cryptogr	aphy.					
3.	summa	aries the	necessar	ry bit	coin and crypto currency	background.	ackground.				
4.	apply t	the func	tion of in	itial	coin offerings.					-	
5.	implen	nent the	applicati	ions	of Block chain.						
UNIT	LI	INTR	ODUCT	ION	TO BLOCKCHAIN	principal.	ELTA W			T	
of Ce Block	entralized schain For schain App	System undation plication	s – Bloc n – Cryp s.	ckeha	s – Layers of Blockchain – in Adoption – Blockcha aphy – Game Theory –	in Uses and Properties	Use Case	es – La	aving	tl ns	
					AND CRYPTOGRAPH Different banks – Corresp		11-11-11-11-11-2				
UNIT	es -Digital								-	_	
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CO5	demonstrate the applications of Block chain.	Applying (K3)
TEXT	BOOKS	

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- Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.

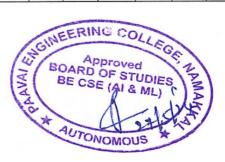
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	PO's													
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	1	1	-	-	3	-	2	-	2	2	1
CO2	3	2	3	3	3	-	-	2	-	3	-	3	1	2
CO3	2	3	3	3	3	-	-	2	-	3	-	2	2	1
CO4	2	3	3	3	3	-	-	2	-	3	-	2	2	1
CO5	3	3	3	3	3	-	-	3	-	3	-	3	1	3



CL20	201					INTERA				2000		
COU	RSE OB	JECTIVES										
To en	able the s	tudents to					15					
1.	underst	and the basic	concep	ts of Humar	-Compute	r Interaction	ons.					
2.	provide validat	the basic	knowled	ge on the	levels of	interaction	n, desig	n mod	lels, ted	chniqu	ies	and
3.	make th	ne learners to	think in	design pers	spective an	d to evalua	ate inter	active	design.	m 1		
4.	use the	guidelines o	f HCI to	analyse and	l propose s	olution for	real lif	e appli	cations.			
5.	become	familiar wit	th recent	technology	trends and	challenge	s in HC	I doma	in.			
UNIT	'I	HCI FOU	NDATIO	ONS		6.0						9
and di	rawing, D pecial dev	isplay devicions, Paper:	es, Devi	ces for virtuand scannin	al reality a	and 3D into	eraction	, Physi	cal con	ing, particular,	sens	ors
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CO4	apply the interface design guidelines for evaluating the developed	Applying (K3)
	interactions.	
CO5	illustrate the different levels of communication across the	Applying (K3)
	application stakeholders.	11.71 (2.5)

- 1. Meena K, "Human Computer Interaction", PHI Learning, 2014.
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CO4	2	1	2	2	2	-	-	-	-	2	-	2	2	1
CO5	2	1	2	2	2	-	-	-	7 =	2	-	2	1	3



OPEN ELECTIVE - I

COU	901		GREE	EN COMPUTING		3 0	0	3
	RSE OBJE	CTIVES						
To en	able the stud	lents to						
1.	understand	the existing	reen computing	strategies, fundamental c	nallenges in a	chievin	g gr	een
				ons to solve some of them				
2.			ssets of GreenIT.					
3.			ocio-cultural aspe					
4.			antum Computin					
5.				s surrounding IT industry				
UNIT			PUTING FUNDA					9
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Green	Data Center working and	s – Data server Communication	s Optimization an n Infrastructure –	M – Green Assets Build d Virtualization – Cloud (Managing Devices for C S OF GREEN IT	Computing and	d Data	Cen	ters
				olders – Role based view				9
securit	ty of Green : Virtual Com	Information –	vity in GreenIT GreenIT project -	 GreenIT Ethics and C Green HR and Changin 	ode Conduct g Organizatio	– Priva	icy a	
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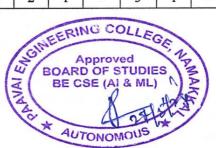
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CO3	3	2	2	2	2	-	3	1	-	-	1	2	2	1	
CO4	3	2	2	2	2	-	3	1	-	-	1	2	2	1	
CO5	3	2	2	2	1	-	3	1	-	-	1	2	1	3	



CL209	902	A Committee of		ARTIFICI	IAL INTE	LLIGEN	CE		3	0	0 3
COUF	RSE OBJ	ECTIVES									
To ena	ible the st	udents to									
1.	unders	tand the basic co	ncepts	of intellige	ent agents.						
2.	develo	p general purpos	e prob	lem-solving	g agents us	ing search	engine	S.			
3.	employ	AI search tech	niques	to solve sor	ne of today	's real-wo	orld pro	blems.			
4.	empha	sis the Logical A	gents.								
5.	elabora	ate Knowledge F	Represe	ntation and	Planning.		TO SECOND				
UNIT	I	INTELLIGEN	T AG	ENTS							9
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structu	re of age	nts Problem solv	ing ag	ents – searc	h algorithn	ns – uninf	ormed s	search str	ategies	S.	-1
UNIT		PROBLEM S									9
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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

		PO's													
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3	2	3	2	1	-	-	1	-	-	-	3	2	1	
CO2	3	2	3	2	1	-	-	1	-	-	-	2	1	2	
CO3	3	3	3	2	2	-	-	1	-	-	-	1	2	1	
CO4	3	3	3	2	2	-	-	1	-	-	-	2	2	1	
CO5	3	3	2	2	2	-	-	1	-	-	-	2	1	3	

